

## NOTES BY THE EDITOR.

## CHINOOKS VERSUS THE KURO SIRO.

Our esteemed voluntary observer, Mr. M. Messner, of Utica, Mont., mentions in a recent letter the fact that "the opinion is prevalent in this country that chinooks are caused by currents of air from the Japan current," and in order to controvert this error he desires to republish an article that lately appeared in the MONTHLY WEATHER REVIEW.

The error alluded to by Mr. Messner is an illustration of the ease with which our schools and newspapers disseminate and the public imbibe errors regarding atmospheric phenomena. The time has long since passed when everyone believed that the baser metals, such as lead, mercury, and silver, could be changed into gold. Chemistry has for a hundred years been taught so clearly and so widely that although some mistakes are still made, yet the grosser errors that belong to a crude stage of civilization have entirely disappeared. Those who believe in the transmutation of metals, or in perpetual motion, or in squaring the circle, are now recognized as men who refuse to be guided by the knowledge that is accessible in every school text-book. A treatise on meteorology that would begin by demolishing the thousand and one errors that we have inherited from our ancestors, or that have been invented by the modern demand for ingenious explanations, is perhaps the first step that is needed in the reformation of the popular conception of this branch of science.

It would require a learned antiquarian to collect all the popular meteorological errors that have been started from time to time and that are still afloat in some part of the world, like derelicts on the ocean. It is not so very long since Professor Loomis demonstrated the error of those who maintained that there is a specific equinoctial gale or storm that reappears every year. We are even now just emerging from the influence of a century of delusion relative to the idea that forests produce rain and that agricultural cultivation of the soil produces droughts. We have just, within twenty-five or thirty years, obtained a clear conception of the warm, dry, descending winds when, lo! a new error with regard to them appears. A century ago it was rational to inquire whether the Gulf Stream had any influence on our own or European weather, but now we know that if it has any, it is at least inappreciable in comparison with the general influence of the ocean. Similarly in the case of the Japanese current, or Kuro Siro, which is to the Pacific what the Gulf Stream is to the Atlantic, we have now from Montana a new query as to its action in forming chinook winds. A first glance at the map of the world must arouse in the mind of a rational person grave doubts as to whether the chinooks of Montana come from the Japan stream. This latter is fully 6,000 miles distant. The winds that blow over it form a part of the general circulation of the Pacific Ocean; eventually, they get into a whirl around the great depression in the North Pacific Ocean in the neighborhood of the Aleutian Islands. The rain and fog in this region and on the coast of Alaska, British Columbia, Washington, and Oregon are demonstrably due to the evaporation from the Pacific Ocean as a whole and to the fact that the winds are rising up over the Rocky Mountain Region. The Japan current, properly so-called, is due to this circulation of the winds; the winds are not due to it. Each square mile of the Pacific Ocean has a slight influence on this circulation, but the Japan current does not occupy one per cent of this area. The mere fact that the westerly winds are rainy and cloudy on the Pacific Coast but are warm and dry in Montana suffices to show that they have undergone a change in passing over the mountains and

that the main features of these winds are due to something that takes place in the Rocky Mountain Region and not on the coast of Japan.

The map of the winds over the North Pacific in the winter months shows a powerful and prevailing cold, northerly current flowing from the interior of Asia over Japan south and southeastward, most of which then turns to the southwest over the Phillipine Islands into the Indian Ocean. What little passes over northern Japan and eastward to the middle of the Pacific Ocean then turns northward and returns in its circulation around the Aleutian area of low pressure. Not one part in ten thousand ever reaches Montana. On the other hand, the southwest wind of our Pacific Coast can easily be traced a little farther southwest and then southerly to the Hawaiian Islands, being a part of the circulation around an area of high pressure whose center lies a little southwest of San Francisco and northeast of Hawaii. These two systems of winds circulating about the highs and lows on the Pacific represent only what is going on at the very bottom of the atmosphere. If we go up 15,000 or 20,000 feet into the region of the upper cirrus clouds that float over all this part of the globe, we shall find them all moving from the west, or between northwest and southwest. It seems likely that a slow process of interchange takes place between this highest stratum and the lowest stratum. In this process the air within the areas of high pressure has a general descending tendency, that is to say, it is drawn from the upper level or that of the cirrus clouds, while the air within the areas of low pressure has an ascending tendency, and eventually reaches the level of the cirrus clouds. But these general tendencies upward and downward require considerable time, it may be days or weeks or months, according to circumstances, to complete an entire circulation for any given particle of air; in the course of this long period any given cubic foot of air may be dispersed in all directions, some of its particles going northward and some southward, some ascending and some descending until it is so dispersed that it would be impossible to trace the air that forms a chinook in Montana backward to any given region 500 miles away.

## NOTES FROM THE REPORTS OF STATE SECTIONS.

A few of the reports from the State Sections, such as those from California, Washington, Oregon, North Dakota, and New York, are not published in full early enough to be quoted in these notes, which are, therefore, culled from the remaining States only.

## COLORADO.

Mr. Brandenburg's special reports of snowfall enable him to state that—

March has been similar to the winter months as regards deficient snowfall, and there has been no increase of consequence in the amount of snow stored in the mountains. None of the reports indicate anything near the average March snowfall, though in a few localities the fall has been somewhat greater than during the winter months.

## IOWA.

Among the numerous interesting notes published by Dr. Chappel is a quotation relative to the earth's shadow as seen in the atmosphere, which suggests the following note by the present Editor. Shortly after sunset the eastern horizon is surmounted by a dark, purplish haze; above this is a more or less well-defined pink or reddish flat arch, stretching from northwest to southeast, or from north-northwest to south-southeast, and above that a whitish haze shading off into the blue sky above. As we survey the sky above and west of this

arch we find that the highest clouds that receive the sun's light appear white, while the lower clouds are of rich salmon and golden tints, and that every shade of intermediate color is found here and there between, down to the very lowest clouds, which receive no direct sunlight and are of ashy white or dark gray. If we recall that the color of the sun was dark red or bright salmon when last seen at sunset, we shall at once realize that if we could rise upward a little way until we again saw the sun in the horizon we should be where these brilliant-colored clouds now are and that the color of the illumination of the clouds must grow deeper and deeper as the sun sinks deeper in the west, or rather as the earth, revolving eastward, carries the clouds more and more deeply into its own shadow, until finally they receive no direct sunlight at all, but perhaps a little reflection from surrounding objects. The deep-red arch seen in the east is the boundary between the illuminated part of the atmosphere and the darker portion below; it rises higher every minute, and eventually passes over our zenith and sinks in the west or northwest. The so-called civil twilight ends and night begins when this arch passes westward over the zenith, but the astronomical twilight ends only when the arch disappears in the western horizon, so that the entire sky is free from diffuse sunlight. Owing to the influence of clouds or hills in the distant west and of possible haze at great heights, such as that of 1884-85, the end of the astronomical twilight may vary to a very great extent. In northern latitudes, such as St. Petersburg, on the 21st of June, when at midnight the sun is only a few degrees below the northern horizon, the twilight arch at that time stretches from east to west, reaching up half way to the zenith and is very sharply defined. Observations of this arch were formerly used as a basis for the calculation of the altitude of the upper limit of the atmosphere and gave results of from 40 to 50 miles, but it is now well understood that this can only refer to the height of such layers of dust or aqueous vapor as are capable of reflecting appreciable light to the eye. The most remarkable sunsets of modern times are those supposed to be due to the vapor thrown up by the eruption of Krakatoa. The aqueous particles that produced the red sunsets of 1884 were undoubtedly large as compared with those ordinarily present at great heights, and may have been correspondingly lower in the atmosphere.

In several of the reports of State sections and in the daily press we find quotations from the bulletin on Storms and Storm Tracks, by Prof. F. H. Bigelow. The reference to this should always be Weather Bureau Bulletin No. 20 and not No. 114, as the latter is simply the current number in the chronological list of publications of the Weather Bureau.

#### NEBRASKA.

Prof. C. E. Bessey, of the University of Nebraska, contributes the following interesting note on the so-called "false dew," known also as "guttation," or the exudation of water drops from leaves:

Observations and experiments made upon many plants in the physiological laboratory and the plant houses of the University of Nebraska show that under certain conditions water may exude in drops from the surface or margin of leaves. It is well known, of course, that water escapes from living leaves in the form of vapor whenever the air is not saturated with moisture. Thus, when a geranium plant is placed upon one of the pans of a pair of scales (after wrapping the pot with sheet rubber so as to prevent evaporation from the soil), it is found that in a little time the loss of water vapor from the leaves is great enough to be readily measured. If the plant be allowed to remain upon the scale pan for a day or two, the amount of water lost will be quite considerable in quantity and weight. This kind of water loss has been well-known for a long time, but there is another loss of water with which we have not been so familiar. To show this, experiments were made as follows:

1. In a box of sandy soil fifty or more kernels of wheat were planted and kept growing vigorously until the plants were two or three inches high. They were kept well watered, so that the roots were fully sup-

plied with water. The air of the laboratory during the experiment was pretty dry, requiring the roots to be quite active in absorbing water to make good the loss of water by evaporation from the leaves. The box was then put over a warm radiator, and the soil slowly warmed to a temperature of 77° to 78° Fahrenheit. After an hour or so drops of water were observed upon the leaves, and these continued to increase in spite of the fact that the humidity of the air was shown by observation to be only 31 per cent.

2. Another box, containing vigorously-growing wheat plants, was treated as follows: Warm water was slowly poured upon the soil, so as to quite considerably raise the temperature. The box was then put under a bell jar and the temperature of the air suddenly lowered by sprinkling the bell jar with water, when water was seen to ooze from the leaves, usually near the tips. This was repeated again and again, always with the same result.

3. Similar trials were made with small plants of maize (indian corn) with similar results.

4. In the plant house small cabbage plants were observed to exude drops of water from the projecting points on their margins under similar conditions.

Here we have an exudation of water drops (known as "guttation") quite resembling the dew which so often wets the grass. At first we might suppose it to be nothing more than dew, but careful tests, which I need not describe here, show it to be an actual exudation. It appears that the roots in the warm, moist soil become very active in absorbing water to supply the water loss through leaf evaporation, and when the latter is suddenly checked by the cooling of the air and consequent increase in its humidity the root pressure forces out the water in the little drops just described. When unusually active, the roots may even force out drops in dry, warm air, as in one of the experiments described above. Exudation may thus take place when the soil is moist and warm, especially when, with these conditions, the air is quickly changed from a hot and dry to a cooler and more humid condition.

#### SULPHUR RAINS.

The Cincinnati Enquirer of March 22 reports that a "sulphur rain" fell at Mount Vernon, Ky., early on the morning of March 21, as also at several other places in Rockcastle County; the stuff burned and gave out fumes of sulphur.

Those who are not seeking after mysteries may rest assured that such a rain of sulphur simply brings down to the ground some pollen from the pine woods, or some other light substance that has only a short time before been carried up by a strong gust of wind. It saddens one to think that any superstition should attach to such an ordinary phenomenon, one that occurs every day of the year at some place on the globe. Still more is it a pity that our daily press should repeat, and apparently indorse, any of the popular errors regarding these and other meteorological phenomena. It is quite as easy for a popular journal to present the best thoughts of the best people as it is to merely diffuse and strengthen the errors of the ignorant. The past century has witnessed the banishment from our text-books of innumerable erroneous ideas that were accepted by our ancestors. Why can not the daily press assist in the work of educating the public and resolutely refuse to print such nonsense as "the people generally consider this a sure harbinger of war," or such headings as "a red sun: bloody omen," or again, "great drought: belief that the world is drying up and that its end is drawing near"? If any one thing is more clearly taught than another by all our teachers, both religious and secular, it is that the future is not and can not be revealed by signs and omens.

#### MOONSHINE AND FROST.

Among the many mysterious meteorological influences ascribed to the moon, the following is quoted from the Evansville (Ind.) Courier of April 4, 1898:

Within the past week there have been several frosts, but to all appearances vegetation is not injured in the least. The reason of the immunity is explained by James Wiltshire, one of the oldest inhabitants of that city, who states that he obtained the idea from Mr. Willard Carpenter more than fifty years ago. Mr. Wiltshire says: "Since then I have carefully observed this every year, and have yet to see the